FORM PTO-1390 (Modified) (REV 11-2000) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)
PD990028	10/009223

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP00/03680	25 APRIL 2000 (25.04.00)	07 MAY1999(07.05.99)and 17MAY1999

TITLE OF INVENTION
METHOD FOR MARKING DIGITAL DATA

APPLICANT(S) FOR DO/EO/US
Marco Winter, Harald Schiller, Seong-Jin Moon, Young-Nam Oh and Sung-Wook Park

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include itens (5), (6), (9) and (24) indicated below.
4. ☐ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☒ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

Return Postcard Receipt

EXPRESS MAIL NO: EL682443004US DATE OF DEPOSIT: NOVEMBER 7, 2001 - Amelia Urban

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
10/009223	PCT/EP00/03680	PD990028

24. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO	**$1040.00**
☒	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO	**$890.00**
☐	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO	**$740.00**
☐	International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)	**$710.00**
☐	International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)	**$100.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =	**$890.00**	
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).	**$0.00**	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	8 - 20 =	0	x $18.00	**$0.00**	
Independent claims	1 - 3 =	0	x $84.00	**$0.00**	
Multiple Dependent Claims **(check if applicable)**.			☐	**$0.00**	
TOTAL OF ABOVE CALCULATIONS =				**$890.00**	
☐ Applicant claims small entity status. See 37 CFR 1.27). The fees indicated above are reduced by 1/2.				**$0.00**	
SUBTOTAL =				**$890.00**	
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**	
TOTAL NATIONAL FEE =				**$890.00**	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).** ☐				**$0.00**	
TOTAL FEES ENCLOSED =				**$890.00**	
				Amount to be: refunded	$
				charged	$ 890.00

a. ☐ A check in the amount of _____ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. **07-0832** in the amount of **$890.00** to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **07-0832** A duplicate copy of this sheet is enclosed.

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Francis A. Davenport

SIGNATURE

FRANCIS A. DAVENPORT

NAME

36,316

REGISTRATION NUMBER

NOVEMBR 7, 2001

DATE

EXPRESS MAIL LABEL NO. EL682443004US

PD990028

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Marco Winter, Harald Schiller, Seong-Jin Moon, Young-Nam Oh and Sung-Wook Park

Filed : April 25, 2000 - PCT National Phase of PCT/EP00/03680

For : METHOD FOR TEMPORARILY ERASING A PART OF A PROGRAM

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Sir:

In the US national phase application of PCT/EP00/03680 please enter the following amendments.

IN THE TITLE:

Please amend the title of the application to read -- METHOD FOR MARKING DIGITAL DATA --

IN THE SPECIFICATION (As Annexed to the International Preliminary Examination Report:

Please amend the specification as follows:

Page 1, line 3, after the title, insert the following:

--This application claims the benefit under 35 U.S.C. § 365 of International Application PCT/EP00/03680, filed April 25, 2000, which claims the benefit of European Patent Application No. 99109065.5, filed May 7, 1999 and European Patent Application No. 99109670.2, filed May 17, 1999.--

Page 1, line 7, delete "Background" and replace with heading:
--BACKGROUND OF THE INVENTION
1. Field of the Invention--

Page 1, line 23, delete "Invention" and replace with heading:
--SUMMARY OF THE INVENTION--

Page 12, line 24 delete "Drawings" and replace with heading:
--BRIEF DESCRIPTION OF THE DRAWINGS--

Page 13, line 1 delete "Exemplary embodiments" and replace with heading: --DETAILED DESCRIPTION--

IN THE CLAIMS (As Annexed to the International Preliminary Examination Report:

Page 19, line 1 delete title, "Claim" and replace with
-- What is claimed is:--

Please amend the claims as follows (clean version):

1. Method for temporarily erasing a part of a program consisting of a digital data stream organized into one or more Stream Objects representing video or audio or other digital data information and original navigation data for facilitating management of the digital data stream recorded in a recording medium wherein the navigation data of the program contains one or more cells and the cells are logically linked with said Stream Objects by stream cell information, and said Stream Objects comprise one or more stream object units,
(A) generating new navigation data of a corresponding Stream Object in case part of said Stream Object is intended to be temporarily erased, said navigation data are generated in such a way that the corresponding stream cell information of said navigation data is split

depending on the coverage of said intended-to-be-deleted part of said Stream Object by taking following steps,

(a1) If the part of the program to be temporarily erased covers neither the start of a current cell nor the end of said current cell, then said current cell is split into three parts

with a first part assigned to a first part of the Stream Object, which is displayable,

with a second part assigned to a second part of said Stream Object [(SOB)], which is temporarily erased and therefore not displayable, and

with a third part assigned to a third part of said Stream Object, which is displayable;

(a2) If the part of said program to be temporarily erased covers the start of said current cell but not the end of said current cell, then said current cell shall be split into two parts

with a first part assigned to a first part of said Stream Object, which is temporarily erased and therefore not displayable, and

with a second part assigned to a second part of said Stream Object, which is displayable;

(a3) If the part of said program to be temporarily erased does not cover the start of said current cell but the end of said current cell, then said current cell shall be split into two parts

with a first part assigned to a first part of a Stream Object, which is displayable, and

with a second part assigned to a second part of a Stream Object, which is temporarily erased and therefore not displayable;

(a4) If the part of said program to be temporarily erased covers the start and the end of said current cell, then said current cell representing said part of said Stream

Object shall be changed from displayable to temporarily erased and therefore not displayable,

(B) creating a link of the generated new navigation data with said Stream Object,

(C) replacing original navigation data with generated new navigation data.

2. Method according to claim 1, including the following steps:

setting within the generated navigation data for temporarily erased cells a Stream Cell Start Application Packet Arrival Time and a Stream Cell End Application Packet Arrival Time,

whereby said Stream Cell Start Application Packet Arrival Time is equal to an Application Packet Arrival Time of the first application packet of a Stream Object Unit.

3. Method according to claim 2, including the following steps:

setting said Stream Cell Start Application Packet Arrival Time by the following rules:

if the part of said Stream Object, which is temporarily erased, covers the start of the Stream Object, then

said Stream Cell Start Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of the first Stream Object Unit of the Stream Object;

if the part of said Stream Object, which is temporarily erased, does not cover the start of the Stream Object, then said Stream Cell Start Application Packet Arrival Time is equal to or greater than the Application Packet Arrival Time of first application packet of the temporarily erased cell and

said Stream Cell Start Application Packet Arrival Time is as close as possible to the Application Packet Arrival Time of the first application packet of the temporarily erased cell;

said Stream Cell End Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of a Stream Object Unit;

if the part of said Stream Object, which is temporarily erased, covers the end of the Stream Object, then

said Stream Cell End Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of the Stream Object Unit following immediately the last Stream Object Unit of this Stream Object;

if the part of said Stream Object, which is temporarily erased, does not cover the end of the Stream Object, then

said Stream Cell End Application Packet Arrival Time is equal to or less than the Application Packet Arrival Time of the application packet which follows immediately the last application packet of the temporarily erased cell and

said Stream Cell End Application Packet Arrival Time is as close as possible to the Application Packet Arrival Time of the last application packet of the temporarily erased cell.

4. Method according to claim 1, including the following steps:

setting within the generated navigation data for a part of said Stream Object, which is temporarily erased, an Erase Start Application Packet Arrival Time whereby

said Erase Start Application Packet Arrival Time is equal to an Application Packet Arrival Time of the first application packet of a Stream Object Unit.

5. Method according to claim 4, including the following steps:

setting said Erase Start Application Packet Arrival Time by the following rules:

said Erase Start Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of a Stream Object Unit;

if the part of said Stream Object, which is temporarily erased, covers the start of the Stream Object, then

said Erase Start Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of the first Stream Object Unit of the Stream Object;

if the part of said Stream Object, which is temporarily erased, does not cover the start of the Stream Object, then said Erase Start Application Packet Arrival Time is equal to or greater than the Application Packet Arrival Time of first application packet of the part of said Stream Object, which is temporarily erased, and

said Erase Start Application Packet Arrival Time is as close as possible to the Application Packet Arrival Time of the first application packet of the part of said Stream Object, which is temporarily erased;

said Erase End Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of a Stream Object Unit;

if the part of said Stream Object, which is temporarily erased, covers the end of the Stream Object, then

said Erase End Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of the Stream Object Unit following

immediately the last Stream Object Unit of this Stream Object;

if the part of said Stream Object, which is temporarily erased, does not cover the end of the Stream Object, then

said Erase End Application Packet Arrival Time is equal to or less than the Application Packet Arrival Time of the application packet which follows immediately the last application packet of the part of said Stream Object, which is temporarily erased.

6. Method according to claim 4, including the following steps:

setting within the generated navigation data for a part of said Stream Object, which is temporarily erased, an Erase End Application Packet Arrival Time whereby

said Erase End Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of a Stream Object Unit.

7. Method according to claim 6, including the following steps:

setting said Erase End Application Packet Arrival Time by the following rules:

said Erase End Application Packet Arrival Time is as close as possible to the Application Packet Arrival Time of the last application packet of the part of said Stream Object, which is temporarily erased.

8. Method according to claim 4, including the following steps:

setting within the generated navigation data for a part of said Stream Object, which is temporarily erased, a Stream Cell Start Application Packet Arrival Time and a Stream Cell End Application Packet Arrival Time,

said Stream Cell Start Application Packet Arrival Time is equal to the Application Packet Arrival Time of the first application packet of the part of said Stream Object, which is temporarily erased, and

said Stream Cell End Application Packet Arrival Time is equal to the Application Packet Arrival Time of the last application packet of the part of said Stream Object, which is temporarily erased.

IN THE ABSTRACT:

Page 23 Please add the Abstract supplied on a separate sheet herewith.

REMARKS

The title has been amended to conform to the title of the published application (WO 00/68949).

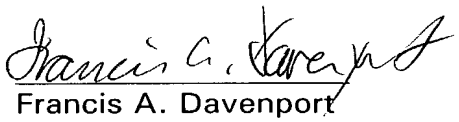
The specification has been amended to include a reference to the priority applications.

The above amendments to the claims have been made to eliminate reference indicia and to meet the requirements of the USPTO. A marked up version is supplied on a separate sheet.

An Abstract is supplied on a separate sheet.

No fee is believed to have been incurred by virtue of this amendment. However if a fee is incurred on the basis of this amendment, please charge such fee against deposit account 07-0832.

Respectfully submitted,
Marco Winter et al.



Francis A. Davenport
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609/734-9864

Enclosures

THOMSON multimedia Licensing Inc.
Patent Operation
PO Box 5312
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November 7, 2001

ABSTRACT

A method is proposed introducing a temporarily erased flag in order to indicate a cell to be temporarily erased. In addition, necessary time stamps are set for complete Stream Object Units to be erasable to enable on the fly permanent erasure without any additional view into the streams or quick permanent erasure. Advantageously the temporarily erasure can also be completely withdrawn.

MARKED UP CLAIMS

[CLAIMS]

What is claimed is:

1. (Amended) Method for temporarily erasing a part of a program consisting of a digital data stream organized into one or more Stream Objects [(SOB)] representing video or audio or other digital data information and original navigation data [(cell #k)] for facilitating management of the digital data stream recorded in a recording medium wherein the navigation data [(cell #k)] of the program contains one or more cells and the cells are logically linked with said Stream Objects [(SOB)] by stream cell information [(SCI)], and said Stream Objects [(SOB)] comprise one or more stream object units [(SOBU)],

(A) generating new navigation data [(cell #k, cell #k+1, cell #k+2)] of a corresponding Stream Object [(SOB)] in case part of said Stream Object [(SOB)] is intended to be temporarily erased, said navigation data [(cell #k, cell #k+1, cell #k+2)] are generated in such a way that the corresponding stream cell information [(SCI)] of said navigation data [(cell #k, cell #k+1, cell #k+2)] is split depending on the coverage of said intended-to-be-deleted part of said Stream Object [(SOB)] by taking following steps,

(a1) If the part of the program to be temporarily erased covers neither the start of a current cell [(cell #k)] nor the end of said current cell [(cell #k)], then said current cell [(cell #k)] is split into three parts

with a first part [(cell #k)] assigned to a first part of the Stream Object [(SOB)], which is displayable,

with a second part [(cell #k+1)] assigned to a second part of said Stream Object [(SOB)], which is temporarily erased and therefore not displayable, and

with a third part [(cell #k+2)] assigned to a third part of said Stream Object [(SOB)], which is displayable;

(a2) If the part of said program to be temporarily erased covers the start of said current cell [(cell #k)] but not the end of said current cell [(cell #k)], then said current cell [(cell #k)] shall be split into two parts

with a first part [(cell #k)] assigned to a first part of said Stream Object [(SOB)], which is temporarily erased and therefore not displayable, and

with a second part [(cell #k+1)] assigned to a second part of said Stream Object [(SOB)], which is displayable;

(a3) If the part of said program to be temporarily erased does not cover the start of said current cell [(cell #k)] but the end of said current cell [(cell #k)], then said current cell [(cell #k)] shall be split into two parts

with a first part [(cell #k)] assigned to a first part of a Stream Object [(SOB)], which is displayable, and

with a second part [(cell #k+1)] assigned to a second part of a Stream Object [(SOB)], which is temporarily erased and therefore not displayable;

(a4) If the part of said program to be temporarily erased covers the start and the end of said current cell [(cell #k)], then said current cell [(cell #k)] representing said part of said Stream Object [(SOB)] shall be changed from displayable to temporarily erased and therefore not displayable,

(B) creating a link of the generated new navigation data [(cell #k, cell #k+1, cell #k+2)] with said Stream Object [(SOB)],

(C) replacing original navigation data [(cell #k)] with generated new navigation data [(cell #k, cell #k+1, cell #k+2)].

2. (Amended) Method according to claim 1, including the following steps:

setting within the generated navigation data [(cell #k, cell #k+1, cell #k+2)] for temporarily erased [(TE)] cells a Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] and a Stream Cell End Application Packet Arrival Time [(SC_E_APAT)],

whereby said Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] is equal to an Application Packet Arrival Time [(APAT)] of the first application packet of a Stream Object Unit [(SOBU)].

3. (Amended) Method according to claim 2, including the following steps:

setting said Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] by the following rules:

if the part of said Stream Object [(SOB)], which is temporarily erased, covers the start of the Stream Object [(SOB)], then

said Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of the first Stream Object Unit [(SOBU)] of the Stream Object [(SOB)];

if the part of said Stream Object [(SOB)], which is temporarily erased, does not cover the start of the Stream Object [(SOB)], then said Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] is equal to or greater than the Application Packet Arrival Time [(APAT)] of first application packet of the temporarily erased cell and

said Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] is as close as possible to the Application Packet Arrival Time [(APAT)] of the first application packet of the temporarily erased cell;

said Stream Cell End Application Packet Arrival Time [(SC_E_APAT)] is equal to the Application Packet Arrival

Time [(APAT)] of the first application packet of a Stream Object Unit [(SOBU)];

if the part of said Stream Object [(SOB)], which is temporarily erased, covers the end of the Stream Object [(SOB)], then

said Stream Cell End Application Packet Arrival Time [(SC_E_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of the Stream Object Unit [(SOBU)] following immediately the last Stream Object Unit [(SOBU)] of this Stream Object [(SOB)];

if the part of said Stream Object [(SOB)], which is temporarily erased, does not cover the end of the Stream Object [(SOB)], then

said Stream Cell End Application Packet Arrival Time [(SC_E_APAT)] is equal to or less than the Application Packet Arrival Time [(APAT)] of the application packet which follows immediately the last application packet of the temporarily erased cell and

said Stream Cell End Application Packet Arrival Time [(SC_E_APAT)] is as close as possible to the Application Packet Arrival Time [(APAT)] of the last application packet of the temporarily erased cell.

4. (Amended) Method according to claim 1, including the following steps:

setting within the generated navigation data [(cell #k, cell #k+1, cell #k+2)] for a part of said Stream Object [(SOB)], which is temporarily erased, an Erase Start Application Packet Arrival Time [(ERA_S_APAT)]

whereby said Erase Start Application Packet Arrival Time [(ERA_S_APAT)] is equal to an Application Packet Arrival Time [(APAT)] of the first application packet of a Stream Object Unit [(SOBU)].

5. (Amended) Method according to claim 4, including the following steps:

setting said Erase Start Application Packet Arrival Time [(ERA_S_APAT)] by the following rules:

said Erase Start Application Packet Arrival Time [(ERA_S_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of a Stream Object Unit [(SOBU)];

if the part of said Stream Object [(SOB)], which is temporarily erased, covers the start of the Stream Object [(SOB)], then

said Erase Start Application Packet Arrival Time [(ERA_S_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of the first Stream Object Unit [(SOBU)] of the Stream Object [(SOB)];

if the part of said Stream Object [(SOB)], which is temporarily erased, does not cover the start of the Stream Object [(SOB)], then said Erase Start Application Packet Arrival Time [(ERA_S_APAT)] is equal to or greater than the Application Packet Arrival Time [(APAT)] of first application packet of the part of said Stream Object [(SOB)], which is temporarily erased, and

said Erase Start Application Packet Arrival Time [(ERA_S_APAT)] is as close as possible to the Application Packet Arrival Time [(APAT)] of the first application packet of the part of said Stream Object [(SOB)], which is temporarily erased;

said Erase End Application Packet Arrival Time [(ERA_E_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of a Stream Object Unit [(SOBU)];

if the part of said Stream Object [(SOB)], which is temporarily erased, covers the end of the Stream Object [(SOB)], then

said Erase End Application Packet Arrival Time [(ERA_E_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of the Stream Object Unit [(SOBU)] following immediately the last Stream Object Unit [(SOBU)] of this Stream Object [(SOB)];

if the part of said Stream Object [(SOB)], which is temporarily erased, does not cover the end of the Stream Object [(SOB)], then

said Erase End Application Packet Arrival Time [(ERA_E_APAT)] is equal to or less than the Application Packet Arrival Time [(APAT)] of the application packet which follows immediately the last application packet of the part of said Stream Object [(SOB)], which is temporarily erased.

6. (Amended) Method according to claim 4, including the following steps:

setting within the generated navigation data [(cell #k, cell #k+1, cell #k+2)] for a part of said Stream Object [(SOB)], which is temporarily erased, an Erase End Application Packet Arrival Time [(ERA_E_APAT)]

whereby said Erase End Application Packet Arrival Time [(ERA_E_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of a Stream Object Unit [(SOBU)].

7. (Amended) Method according to claim 6, including the following steps:

setting said Erase End Application Packet Arrival Time [(ERA_E_APAT)] by the following rules:

said Erase End Application Packet Arrival Time [(ERA_E_APAT)] is as close as possible to the Application Packet Arrival Time [(APAT)] of the last application packet of the part of said Stream Object [(SOB)], which is temporarily erased.

8. (Amended) Method according to claim 4, including the following steps:

setting within the generated navigation data [(cell #k, cell #k+1, cell #k+2)] for a part of said Stream Object [(SOB)], which is temporarily erased, a Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] and a Stream Cell End Application Packet Arrival Time [(SC_E_APAT)],

said Stream Cell Start Application Packet Arrival Time [(SC_S_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the first application packet of the part of said Stream Object [(SOB)], which is temporarily erased, and

said Stream Cell End Application Packet Arrival Time [(SC_E_APAT)] is equal to the Application Packet Arrival Time [(APAT)] of the last application packet of the part of said Stream Object [(SOB)], which is temporarily erased.

Method for temporarily erasing a part of a program.

The invention relates to a method for temporarily erasing a part of a program of a digital data stream representing video or audio information.

Background

In bitstream recording one is free to subdivide the bitstream into sub-units of more regular structure. Presentation data in DVDs (digital video or versatile disc) is organised into units called Video Object Unit, denoted VOBU, e.g. in the DVD Specifications for Video Recording. VOBUs have a variable size (data amount measured in number of sectors), but have also a variable duration (measured in number of video fields).

For data retrieval from the disc the DVD Specifications for Video Recording foresees a 'VOBU map' which is a table where for every VOBU in a recording the length in sectors and the duration in fields is entered.

Invention

It is one object of the invention to disclose a method for temporarily erasing a part of a program to enable on the fly permanent erasure without any additional view into the streams or complete withdrawal of the temporarily erasure.

According to the invention, this object is achieved by means of the features specified in main claims. Advantageous designs and developments are specified in subclaims.

The directory and file structure of DVD Stream Recording is organized in Stream Data and Navigation Data of the DVD Stream Recording as follows:

Any DVD Streamer Device has certain requirements to store its own, Streamer-specific navigation data on the disc. These data are solely for helping the retrieval of recorded data; they need not be understood or even be visible to any outside Application Device.

Any DVD Streamer Device needs to communicate with the Application Device it is connected to. This communication should be straightforward, and as universal as possible, so that the maximum possible range of applications - both today and future - can be connected to the Streamer. The Navigation Data to support such communication must be understandable by the Streamer as well as by the Application Device; they will be called „Common navigation data" in the following.

The Streamer Device should offer to the connected Application Device a means for storing its own private data of any desired kind. The Streamer needs not to understand any of the content, internal structure, or meaning of this "Application-specific navigation data".

Navigation data is provided to control the recording, playing back, and editing of any bitstreams that are recorded. In DVD Stream Recording, Navigation Data is called "Streamer Information" (STRI). STRI consists of six kinds of information tables, namely Streamer Video Manager Information (STR_VMGI), Stream File Information Table (SFIT), Original Program Chain Information (ORG_PGCI), User Defined Program Chain Information (UD_PGCI), Text Data Manager (TXT_DT_MG), and Application Private Data Manager (APD_MG).

The Stream File Information Table contains the information where on the recording media the stream data are recorded. The Original PGC Information has the function of a play list, which contains all takes which were made. A take is defined as containing the information between a start and a stop

action in the sequence of recording or also called one program of the ORG_PGCI. In addition, a Stream Object (SOB) contains a full take or part of a take. With both tables the data can be retrieved for playback.

The User Defined PGC Information contains information, which are defined by a user.

In order to address more precisely a program contains one or more cells. A cell points to Stream Object Units (SOBU) and to each SOBU an Incremental Application Packet Arrival Time (IAPAT) is assigned.

According to the invention a temporarily erased flag is introduced in order to indicate a cell to be temporarily erased. In addition necessary time stamps are set in a special way to enable on the fly permanent erasure without any additional view into the streams or quick permanent erasure. Advantageously the temporarily erasure can be withdrawn completely also.

For a permanent erasure of temporarily erased (TE) cells an adaptation of Stream Cell Start Application Packet Arrival Time (SC_S_APAT) and Stream Cell End Application Packet Arrival Time (SC_E_APAT) is needed. In order to realize this during recording a calculation must be performed without any additional views into the stream. This will be realized by following definition of TE cells:
The TE cell covers a part of a SOB. SC_S_APAT and SC_E_APAT of a TE cell are set in a way that only all complete SOBUs, covered by the TE cell, are marked, i.e.
following rules define SC_S_APAT and SC_E_APAT of a TE cell. They must be completely fulfilled:

SC_S_APAT is equal to the Application Packet Arrival Time (APAT) of the first application packet of an SOBU and

if the TE cell covers the start of the SOB, then
SC_S_APAT is equal to the APAT of the first application packet of the first SOBU of the SOB.
In all other cases
SC_S_APAT is equal to or greater than the APAT of the first application packet of the TE part and
SC_S_APAT is as close as possible to the APAT of the first application packet of the TE part.

SC_E_APAT is equal to the APAT of the first application packet of an SOBU and
if the TE cell covers the end of the SOB, then
SC_E_APAT is equal to the APAT of the first application packet of the SOBU following immediately the last SOBU of this SOB.
In all other cases
SC_E_APAT is equal to or less than the APAT of the application packet which follows immediately the last application packet of the TE part and
SC_E_APAT is as close as possible to the APAT of the last application packet of the TE part.

Note 1: The definition above assumes that an SOBU exists after the last SOBU of the SOB. This SOBU doesn't exist really.
Therefore, the following rules define the APAT of the first application packet of the SOBU following immediately the last SOBU of this SOB:
this APAT is greater than the APAT of the last application packet of this SOB and
the 18 (= MTU_SHFT) least significant bits of this APAT value are set to zero and
this APAT value is as close as possible to the last application packet of the SOB.

Note 2: TE part means all application packets of an SOB which are not part of the normal cells and which are contiguous on the stream, i.e. no breaks via normal cells. The boundaries of TE parts are normal cells or SOB boundaries. Therefore, each TE part contains one TE cell.

Note 3: SC_E_APAT may be less than SC_S_APAT. The TE part contains complete SOBUs only in the case SC_S_APAT < SC_E_APAT.

Note 4: For small SOBUs the SC_S_APAT and the SC_E_APAT will be set by the definition above, so that the streamer is able to recognize whether the TE part is only inside one SOBU (SC_S_APAT > SC_E_APAT) or the TE part starts in one SOBU and ends in the following SOBU (SC_S_APAT = SC_E_APAT). Only for the (normal) case, that the TE part covers complete SOBUs SC_S_APAT will be less than SC_E_APAT.

As a first alternative it is proposed:

Stream Cell General Information (SC_GI)

	Contents	Number of Bytes
	reserved	1
(1) C_TY	Cell Type	1
(2) SC_EPI_Ns	Number of Entry Point Information	2
(3) SOB_N	Stream Object number	2
(4) SC_S_APAT	Stream Cell Start APAT	6
(5) SC_E_APAT	Stream Cell End APAT	6
	Total	18

(1) C_TY

Describes the Cell Type of this Stream Cell.

C_TY1 ... '010b' shall be described for all Stream Cells.

TE ... '0b': This Cell is in the "Normal" state.
'1b': This Cell is in "Temporarily Erased" state.

Preferably C_TY1 is represented by the first MSBs followed by the TE bits. The remaining LSBs are reserved.

(2) SC_EPI_Ns
Describes the number of Entry Point Information contained in this SCI.

(3) SOB_N
Describes the number of the SOB to which this Cell refers.

(4) SC_S_APAT
Describes the Start Application Packet Arrival Time (Start APAT) of this Stream Cell in DVD Stream Recording's PAT Describing Format.
If this cell is a TE cell without a previous TE cell of the same SOB, then this SC_S_APAT describes the APAT of the first Application Packet of the first SOBU, the beginning of which is contained in or after the TE Cell.

(5) SC_E_APAT
For a "Normal" Cell, this describes the End Application Packet Arrival Time (End APAT) of this Stream Cell in DVD Stream Recording's PAT Describing Format.
For a "Temporarily Erased" Cell, this describes the APAT of the first Application Packet of that SOBU which contains the Application Packet immediately following the TE Cell.

The requirements for the temporary erasure:

1. Any TE part of a stream shall be completely reconstructable.
2. The start and end location marks of the TE parts shall be time based with APAT precision (note: the consumer doesn't know anything about SOBs, SOBUs or MAPLs).

3. During a recording the TE parts shall be permanently erasable without any view into the stream (real time recycling).

The realization of these requirements is done by a TE flag inside the cells of the original PGCs. This flag indicates cells which are temporarily erased.

A TE process changes the ORG_PGCI. The UD_PGCI and the SFI content won't be changed. The main action is done inside the program #j. The temporary erasure will be done by separating the cells of the program #j into the parts which covers the normal stream part (not erased) and the TE part.

After the reconstruction the complete Nav. Data is completely identical with the state before the temporary erasure.

Rules for SC_S_APAT and SC_E_APAT for normal Cells

The normal cells point into its assigned SOB, i.e. if SC_E_APAT is equal to SOB_E_APAT of its assigned SOB, then this cell ends with the last application packet of its assigned SOB.

The nomenclature to define SC_S_APAT and SC_E_APAT is as follows:

1. cell #k shall denote the normal cell
2. $SC\_S\_APAT_k$ and $SC\_E\_APAT_k$ shall denote the start and end time of cell #k
3. SOB_N(k) shall denote the assigned SOB number of cell #k.

The definition of SC_S_APAT and SC_E_APAT of normal cells:

1. $SOB\_S\_APAT_{SOB\_N(k)} \leq SC\_S\_APAT_k \leq SC\_E\_APAT_k \leq SOB\_E\_APAT_{SOB\_N(k)}$
2. $SC\_S\_APAT_k$ is equal to the APAT of the application packet inside SOB #SOB_N(k) which represents the first application packet of cell #k

3. $SC\_E\_APAT_k$ is equal to the APAT of the application packet inside SOB #SOB_N(k) which represents the last application packet of cell #k

Rules for SC_S_APAT and SC_E_APAT for TE Cells

The information stored in the TE cells shall be defined in a way

- that the original state of the program is 100% reconstructable and
- that the by the TE part completely covered SOBUs are indicated (this is demanded in order to be able to reuse complete SOBUs of TE parts on the fly during recording, i.e. without any view into the stream)

The nomenclature to define SC_S_APAT and SC_E_APAT is as follows:

- cell #k shall denote the TE cell
- $SC\_S\_APAT_k$ and $SC\_E\_APAT_k$ shall denote the start and end time of cell #k
- SOB_N(k) shall denote the assigned SOB number of cell #k.

The definition of SC_S_APAT and SC_E_APAT of TE cells:

1. if the TE part starts with the first Application Packet of a SOBU or the TE part contains the start of the SOB, then SC_S_APAT is the APAT of the first Application Packet of that SOBU which contains the first Application Packet of the TE part.
2. In all other cases:
   2.1 If k>1 and cell #k-1 is a TE cell of the SOB #SOB_N(k), then

$SC\_S\_APAT_k$ is the APAT of the first Application Packet of this TE part.

2.2 In all other cases: $SC\_S\_APAT_k$ is equal to the APAT of the first Application Packet of that SOBU which follows immediately the SOBU containing the first Application Packet of the TE part.

3. $SC\_E\_APAT_k$ is equal to the APAT of the first Application Packet of that SOBU which contains the Application Packet immediately following the TE part.

Note 1: The definition above for SC_S_APAT and SC_E_APAT assumes that an Application Packet exists after the last Application Packet of the SOB. This Application Packet doesn't exist really. Therefore, the following rules define the APAT of the Application Packet following immediately the last Application Packet of this SOB:

- this APAT is an integer multiple of the IAPAT Time Unit and
- this APAT is greater than the APAT of the last Application Packet of this SOB and
- this APAT is as close as possible to the last Application Packet of the SOB and
- this APAT is an APAT of the first Application Packet of a SOBU

Note 2: TE part means all application packets of an SOB which are not part of the normal cells and which are contiguous on the stream, i.e. no breaks via normal cells. The boundaries of TE parts are either normal cells, other TE cells or SOB boundaries. Therefore, each TE part contains one TE cell.

Note 3: SC_E_APAT may be less than SC_S_APAT. The TE part contains complete SOBUs only in the case SC_S_APAT < SC_E_APAT. The 3 possible cases of SC_S_APAT and SC_E_APAT of an TE cell:

1) SC_S_APAT < SC_E_APAT

There is at least one complete SOBU inside the TE part of this TE cell. All complete SOBUs of this TE part can be permanently erased (e.g. during recording).

2) SC_S_APAT = SC_E_APAT

There is no complete SOBU inside the TE part of this TE cell. But the TE part has Application Packets in 2 SOBUs. A permanent erasure would split the assigned SOB between these 2 SOBUs into 2 SOBs. I.e. the resulting 2 SOBs doesn't share any SOBU.

3) SC_S_APAT > SC_E_APAT

There is no complete SOBU inside the TE part of this TE cell. The TE part has Application Packets only in 1 SOBU. A permanent erasure would split the assigned SOB inside one SOBU into 2 SOBs. I.e. the resulting 2 SOBs share a common SOBU.

So, each state is unambiguous and contains a lot of information about the location of the cells inside the stream.

As a second alternative it is proposed:

Stream Cell General Information (SC_GI)

	Contents	Number of Bytes
	reserved	1
(1) C_TY	Cell Type	1
(2) SC_EPI_Ns	Number of Entry Point Informations	2
(3) SOB_N	Stream Object number	2
(4) SC_S_APAT	Stream Cell Start APAT	6
(5) SC_E_APAT	Stream Cell End APAT	6
if (TE=='10b') {		
(6) ERA_S_APAT	*Erase Start APAT*	*6*
(7) ERA_E_APAT	*Erase End APAT*	*6*

/		
	Total	18 or 30

with:

(1) C_TY

Describes the Cell Type of this Stream Cell.

C_TY1 ... '010b' shall be described for all Stream Cells.

TE ... '00b': This Cell is in the "Normal" state.

'01b': This Cell is in "Temporarily Erased" state; and this Cell starts after the first Application Packet of a SOBU and ends before the last Application Packet of the same SOBU.

'10b': This Cell is in "Temporarily Erased" state; and this Cell contains at least one SOBU border (first or last Application Packet of a SOBU). ERA_S_APAT and ERA_E_APAT exist for this Cell.

(2) SC_EPI_Ns

Describes the number of Entry Point Information contained in this SCI.

(3) SOB_N

Describes the number of the SOB to which this Cell refers.

(4) SC_S_APAT

Describes the Start Application Packet Arrival Time (Start APAT) of this Stream Cell in DVD Stream Recording's PAT Describing Format.

(5) SC_E_APAT

Describes the End Application Packet Arrival Time (End APAT) of this Stream Cell in DVD Stream Recording's PAT Describing Format.

(6) ERA_S_APAT

For a "Temporarily Erased" Cell, this describes the APAT of the first Application Packet of the first SOBU, the beginning of which is contained in the TE Cell or after that Cell.

(7) ERA_E_APAT

For a "Temporarily Erased" Cell, this describes the APAT of the first Application Packet of that SOBU which contains the Application Packet immediately following the TE Cell.

The SCI definition of the ORG_PGCI contains a TE flag inside C_TY (Cell Type) of its SC_GI. This TE flag indicates whether this is an TE cell (TE flag is set) or a normal cell (TE flag is cleared).

Drawings

Embodiments of the invention are described with reference to the accompanying drawing, which shows in:

Fig. 1 TE and Permanent Erasure seen from SOBU level;

Fig. 2 The principle of temporary erasure including reconstruction;

Fig. 3 principle of a permanent erasure of a TE part;

Fig. 4 Temporary erasure and subsequent permanent erasure;

Fig. 5 TE and subsequent further TE and reconstruction of the first TE cell.

Exemplary embodiments

Exemplary embodiments of the invention are explained in more detail in the following description.

In figure 1 TE and Permanent Erasure seen from SOBU level is shown. In the upper part of the drawing labeled "original program" a program #j contains one cell #k with one SC_S_APAT and one SC_E_APAT. The cell #k contains several SOBUs from

SOBU #1 to SOBU #6. To each SOBU an Incremental Application Packet Arrival Time (IAPAT) is assigned.

In the middle part labeled "after TE" the gray marked part of program #j is marked for example by a user or based on given parameter as being temporarily erased. The program #j contain now 3 cells from cell #k to cell #k+2. Cell #k and cell #k+2 can be played back, while on cell #k+1 an erased flag is set. Cell #k+1 contains a TE part, which was decided to be erased and a smaller TE cell, which can be used for later recording.

To cell #k a new SC_E_APAT and to cell #k+2 a new SC_S_APAT are assigned. To enable on-the-fly erasure SC_E_APAT SC_S_APAT for cell #k+1 have to be calculated by the following rules:

SC_S_APAT is equal to the Application Packet Arrival Time (APAT) of the first application packet of an SOBU and
if the TE cell covers the start of the SOB, then
SC_S_APAT is equal to the APAT of the first application packet of the first SOBU of the SOB.
In all other cases
SC_S_APAT is equal to or greater than the APAT of the first application packet of the TE part and
SC_S_APAT is as close as possible to the APAT of the first application packet of the TE part.

SC_E_APAT is equal to the APAT of the first application packet of an SOBU and
if the TE cell covers the end of the SOB, then
SC_E_APAT is equal to the APAT of the first application packet of the SOBU following immediately the last SOBU of this SOB.
In all other cases

SC_E_APAT is equal to or less than the APAT of the application packet which follows immediately the last application packet of the TE part and SC_E_APAT is as close as possible to the APAT of the last application packet of the TE part.

The program #j contains now 3 cells from cell #k to cell #k+2. Cell #k and cell #k+2 can be played back, while on cell #k+1 an erased flag is set.

In the lower part labeled "after permanent erasure" the program #j contains only two cells, that are cell #k and cell #k+1 (former cell #k+2), while the TE cell of the former cell #k+1 was erased.

The SOBUs of each cell #k and cell #k+1 have been renumbered and also the assigned IAPATs. As shown in this example a small area marked in gray remains in the bit stream, which cannot be used for recording of further data.

After permanent erasure the Stream File Information, the Original PGC Information and the User Defined PGC Information are updated.

Description and requirements for User Operations related to Temporary Erasure.

The invention handles two kinds of erasure. The first one is to permanently erase parts of a stream. The other one is to temporarily erase (TE) parts of a stream. Fig. 2 shows the principle of temporary erasure including reconstruction.

The requirements for the temporary erasure:

1. Any TE part of a stream shall be completely reconstructable.

2. The start and end location marks of the TE parts shall be time based with APAT precision because the consumer doesn't know anything about SOBs, SOBUs or MAPLs.

3. During a recording the TE parts shall be permanently erasable without any view into the stream that means real time recycling.

The realization of these requirements is done by a TE flag inside the cells of the original PGCs. This flag indicates cells which are temporarily erased.

Fig. 3 shows the principle of a permanent erasure of a TE part.
A TE process changes the ORG_PGCI. The UD_PGCI and the SFI content won't be changed. The main action is done inside the program #j. The temporary erasure will be done by separating the cells of the program #j into the parts which covers the normal stream part - not erased - and the TE part.

After the reconstruction the complete Navigation Data is completely identical with the state before the temporary erasure.

Rules for SC_S_APAT and SC_E_APAT for Cells

The normal and the TE cells point into its assigned SOB, i.e. if SC_E_APAT is equal to SOB_E_APAT of its assigned SOB, then this cell ends with the last application packet of its assigned SOB.

The nomenclature to define SC_S_APAT and SC_E_APAT is as follows:

1. cell #k shall denote the normal or TE cell

2. $SC\_S\_APAT_k$ and $SC\_E\_APAT_k$ shall denote the start and end time of cell #k

3. SOB_N(k) shall denote the assigned SOB number of cell #k.

The definition of SC_S_APAT and SC_E_APAT of normal and TE cells:

1. $SOB\_S\_APAT_{SOB\_N(k)} \leq SC\_S\_APAT_k \leq SC\_E\_APAT_k \leq SOB\_E\_APAT_{SOB\_N(k)}$
2. SC_S_APAT$_k$ is equal to the APAT of the application packet inside SOB #SOB_N(k) which represents the first application packet of cell #k
3. SC_E_APAT$_k$ is equal to the APAT of the application packet inside SOB #SOB_N(k) which represents the last application packet of cell #k

Rules for ERA_S_APAT and ERA_E_APAT for TE Cells

Only when a TE cell covers at least one SOBU border - start or end application packet of a SOBU -, then this TE cell contains ERA_S_APAT and ERA_E_APAT. These two APATs mark the SOBUs which are completely covered by a TE cell. This information is useful to reuse the TE SOBUs on-the-fly, i.e. without any view into the stream.

The definition of ERA_S_APAT and ERA_E_APAT:

1. if SC_S_APAT is the first Application Packet of a SOBU or the TE Cell contains the start of the SOB, then ERA_S_APAT is equal to the APAT of the first Application Packet of that SOBU which contains the Application Packet with the APAT SC_S_APAT.
2. In all other cases ERA_S_APAT is equal to the APAT of the first Application Packet of that SOBU which follows immediately the SOBU containing the Application Packet with the APAT SC_S_APAT.
3. ERA_E_APAT is equal to the APAT of the first Application Packet of that SOBU which contains the Application Packet immediately following the TE Cell

Note 1: The definitions above for ERA_S_APAT and ERA_E_APAT assume that an Application Packet exists after the last Application Packet of the SOB. This Application Packet

doesn't exist really. Therefore, the following rules define the APAT of the Application Packet following immediately the last Application Packet of this SOB:

- this APAT is an integer multiple of the IAPAT Time Unit and
- this APAT is greater than the APAT of the last Application Packet of this SOB and
- this APAT is as close as possible to the last Application Packet of the SOB and
- this APAT is an APAT of the first Application Packet of a SOBU

Note 2: ERA_S_APAT may be equal to ERA_E_APAT, i.e. no complete SOBU is covered by the TE cell. The TE cell contains complete SOBUs only for the case ERA_S_APAT < ERA_E_APAT. If even ERA_S_APAT is equal to ERA_E_APAT inside each TE cell of a TE cell chain, then between the TE cells are complete SOBUs.

Note 3: TE cells which start after the first application packet of a SOBU and ends before the last application packet of the same SOBU will have no ERA_S_APAT and no ERA_E_APAT.

Following figures shall explain the definition of TE cells. Fig. 4 shows a temporary erasure with a subsequent permanent erasure of the just temporarily erased part. Fig. 5 shows a temporary erasure with a subsequent second temporary erasure behind the just temporarily erased part. After that, a reconstruction of the first TE part is shown.

The gray parts mark the not presentable (TE) parts of the stream. The dark gray parts mark the temporarily erased complete SOBUs.

Re-use of TE cells on-the-fly during recording

The TE cells contain 2 special APATs: ERA_S_APAT and ERA_E_APAT. The actual intention of these 2 APATs is to allow to reuse TE SOBUs during recording, i.e. when the disc becomes full during recording, then the streamer shall be able to permanently erase TE cells, in order to get new free SOBUs to continue the recording without any break. The APATs SC_S_APAT and SC_E_APAT of the TE cell aren't exact enough for this purpose, because a search via the MAPL results in 2 possible positions of the assigned SOBU (SOBU #m or SOBU #m+1). A search via the MAPL would require an additional search inside the stream. That's not possible in realtime. But, with ERA_S_APAT and ERA_E_APAT the exact SOBU position is locateable via the MAPL without any view into the stream.

Amended claims

1. Method for temporarily erasing a part of a program consisting of a digital data stream organized into one or more Stream Objects (SOB) representing video or audio or other digital data information and original navigation data (cell #k) for facilitating management of the digital data stream recorded in a recording medium wherein the navigation data (cell #k) of the program contains one or more cells and the cells are logically linked with said Stream Objects (SOB) by stream cell information (SCI), and said Stream Objects (SOB) comprise one or more stream object units (SOBU),

(A) generating new navigation data (cell #k, cell #k+1, cell #k+2) of a corresponding Stream Object (SOB) in case part of said Stream Object (SOB) is intended to be temporarily erased, said navigation data (cell #k, cell #k+1, cell #k+2) are generated in such a way that the corresponding stream cell information (SCI) of said navigation data (cell #k, cell #k+1, cell #k+2) is split depending on the coverage of said intended-to-be-deleted part of said Stream Object (SOB) by taking following steps,

(a1) If the part of the program to be temporarily erased covers neither the start of a current cell (cell #k) nor the end of said current cell (cell #k), then said current cell (cell #k) is split into three parts

with a first part (cell #k) assigned to a first part of the Stream Object (SOB), which is displayable,

with a second part (cell #k+1) assigned to a second part of said Stream Object (SOB), which is temporarily erased and therefore not displayable, and

with a third part (cell #k+2) assigned to a third part of said Stream Object (SOB), which is displayable;

(a2) If the part of said program to be temporarily erased covers the start of said current cell (cell #k) but not the end of said

current cell (cell #k), then said current cell (cell #k) shall be split into two parts
with a first part (cell #k) assigned to a first part of said Stream Object (SOB), which is temporarily erased and therefore not displayable, and
with a second part (cell #k+1) assigned to a second part of said Stream Object (SOB), which is displayable;
(a3) If the part of said program to be temporarily erased does not cover the start of said current cell (cell #k) but the end of said current cell (cell #k), then said current cell (cell #k) shall be split into two parts
with a first part (cell #k) assigned to a first part of a Stream Object (SOB), which is displayable, and
with a second part (cell #k+1) assigned to a second part of a Stream Object (SOB), which is temporarily erased and therefore not displayable;
(a4) If the part of said program to be temporarily erased covers the start and the end of said current cell (cell #k), then said current cell (cell #k) representing said part of said Stream Object (SOB) shall be changed from displayable to temporarily erased and therefore not displayable,
(B) creating a link of the generated new navigation data (cell #k, cell #k+1, cell #k+2) with said Stream Object (SOB),
(C) replacing original navigation data (cell #k) with generated new navigation data (cell #k, cell #k+1, cell #k+2).

2. Method according to claim 1, including the following steps:

setting within the generated navigation data (cell #k, cell #k+1, cell #k+2) for temporarily erased (TE) cells a Stream Cell Start Application Packet Arrival Time (SC_S_APAT) and a Stream Cell End Application Packet Arrival Time (SC_E_APAT),

whereby said Stream Cell Start Application Packet Arrival Time (SC_S_APAT) is equal to an Application Packet Arrival Time (APAT) of the first application packet of a Stream Object Unit (SOBU).

3. Method according to claim 2, including the following steps:

setting said Stream Cell Start Application Packet Arrival Time (SC_S_APAT) by the following rules:

if the part of said Stream Object (SOB), which is temporarily erased, covers the start of the Stream Object (SOB), then

said Stream Cell Start Application Packet Arrival Time (SC_S_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of the first Stream Object Unit (SOBU) of the Stream Object (SOB);

if the part of said Stream Object (SOB), which is temporarily erased, does not cover the start of the Stream Object (SOB), then said Stream Cell Start Application Packet Arrival Time (SC_S_APAT) is equal to or greater than the Application Packet Arrival Time (APAT) of first application packet of the temporarily erased cell and

said Stream Cell Start Application Packet Arrival Time (SC_S_APAT) is as close as possible to the Application Packet Arrival Time (APAT) of the first application packet of the temporarily erased cell;

said Stream Cell End Application Packet Arrival Time (SC_E_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of a Stream Object Unit (SOBU);

if the part of said Stream Object (SOB), which is temporarily erased, covers the end of the Stream Object (SOB), then

said Stream Cell End Application Packet Arrival Time (SC_E_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of the Stream Object Unit (SOBU) following immediately the last Stream Object Unit (SOBU) of this Stream Object (SOB);

if the part of said Stream Object (SOB), which is temporarily erased, does not cover the end of the Stream Object (SOB), then

said Stream Cell End Application Packet Arrival Time (SC_E_APAT) is equal to or less than the Application Packet Arrival Time (APAT) of the application packet which follows

immediately the last application packet of the temporarily erased cell and

said Stream Cell End Application Packet Arrival Time (SC_E_APAT) is as close as possible to the Application Packet Arrival Time (APAT) of the last application packet of the temporarily erased cell.

4. Method according to claim 1, including the following steps:

setting within the generated navigation data (cell #k, cell #k+1, cell #k+2) for a part of said Stream Object (SOB), which is temporarily erased, an Erase Start Application Packet Arrival Time (ERA_S_APAT)

whereby said Erase Start Application Packet Arrival Time (ERA_S_APAT) is equal to an Application Packet Arrival Time (APAT) of the first application packet of a Stream Object Unit (SOBU).

5. Method according to claim 4, including the following steps:

setting said Erase Start Application Packet Arrival Time (ERA_S_APAT) by the following rules:

said Erase Start Application Packet Arrival Time (ERA_S_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of a Stream Object Unit (SOBU);

if the part of said Stream Object (SOB), which is temporarily erased, covers the start of the Stream Object (SOB), then

said Erase Start Application Packet Arrival Time (ERA_S_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of the first Stream Object Unit (SOBU) of the Stream Object (SOB);

if the part of said Stream Object (SOB), which is temporarily erased, does not cover the start of the Stream Object (SOB), then said Erase Start Application Packet Arrival Time (ERA_S_APAT) is equal to or greater than the Application Packet Arrival Time (APAT) of first application packet of the

part of said Stream Object (SOB), which is temporarily erased, and

said Erase Start Application Packet Arrival Time (ERA_S_APAT) is as close as possible to the Application Packet Arrival Time (APAT) of the first application packet of the part of said Stream Object (SOB), which is temporarily erased;

said Erase End Application Packet Arrival Time (ERA_E_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of a Stream Object Unit (SOBU);

if the part of said Stream Object (SOB), which is temporarily erased, covers the end of the Stream Object (SOB), then

said Erase End Application Packet Arrival Time (ERA_E_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of the Stream Object Unit (SOBU) following immediately the last Stream Object Unit (SOBU) of this Stream Object (SOB);

if the part of said Stream Object (SOB), which is temporarily erased, does not cover the end of the Stream Object (SOB), then

said Erase End Application Packet Arrival Time (ERA_E_APAT) is equal to or less than the Application Packet Arrival Time (APAT) of the application packet which follows immediately the last application packet of the part of said Stream Object (SOB), which is temporarily erased.

6. Method according to claim 4, including the following steps:

setting within the generated navigation data (cell #k, cell #k+1, cell #k+2) for a part of said Stream Object (SOB), which is temporarily erased, an Erase End Application Packet Arrival Time (ERA_E_APAT)

whereby said Erase End Application Packet Arrival Time (ERA_E_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of a Stream Object Unit (SOBU).

7. Method according to claim 6, including the following steps:

setting said Erase End Application Packet Arrival Time (ERA_E_APAT) by the following rules:

said Erase End Application Packet Arrival Time (ERA_E_APAT) is as close as possible to the Application Packet Arrival Time (APAT) of the last application packet of the part of said Stream Object (SOB), which is temporarily erased.

8. Method according to claim 4, including the following steps:

setting within the generated navigation data (cell #k, cell #k+1, cell #k+2) for a part of said Stream Object (SOB), which is temporarily erased, a Stream Cell Start Application Packet Arrival Time (SC_S_APAT) and a Stream Cell End Application Packet Arrival Time (SC_E_APAT),

said Stream Cell Start Application Packet Arrival Time (SC_S_APAT) is equal to the Application Packet Arrival Time (APAT) of the first application packet of the part of said Stream Object (SOB), which is temporarily erased, and

said Stream Cell End Application Packet Arrival Time (SC_E_APAT) is equal to the Application Packet Arrival Time (APAT) of the last application packet of the part of said Stream Object (SOB), which is temporarily erased.

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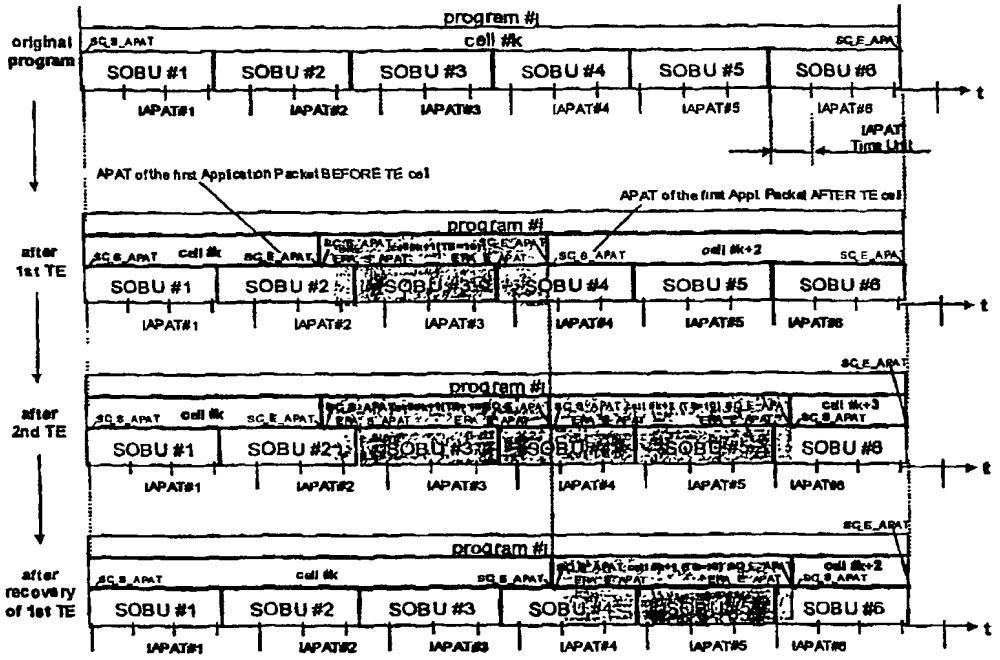

(57) Abstract

A method is proposed introducing a temporarily erased flag in order to indicate a cell to be temporarily erased. In addition, necessary time stamps are set for complete Stream Object Units (SOBUs) to be erasable to enable on the fly permanent erasure without any additional view into the streams or quick permanent erasure. Advantageously the temporarily erasure can also be completely withdrawn.

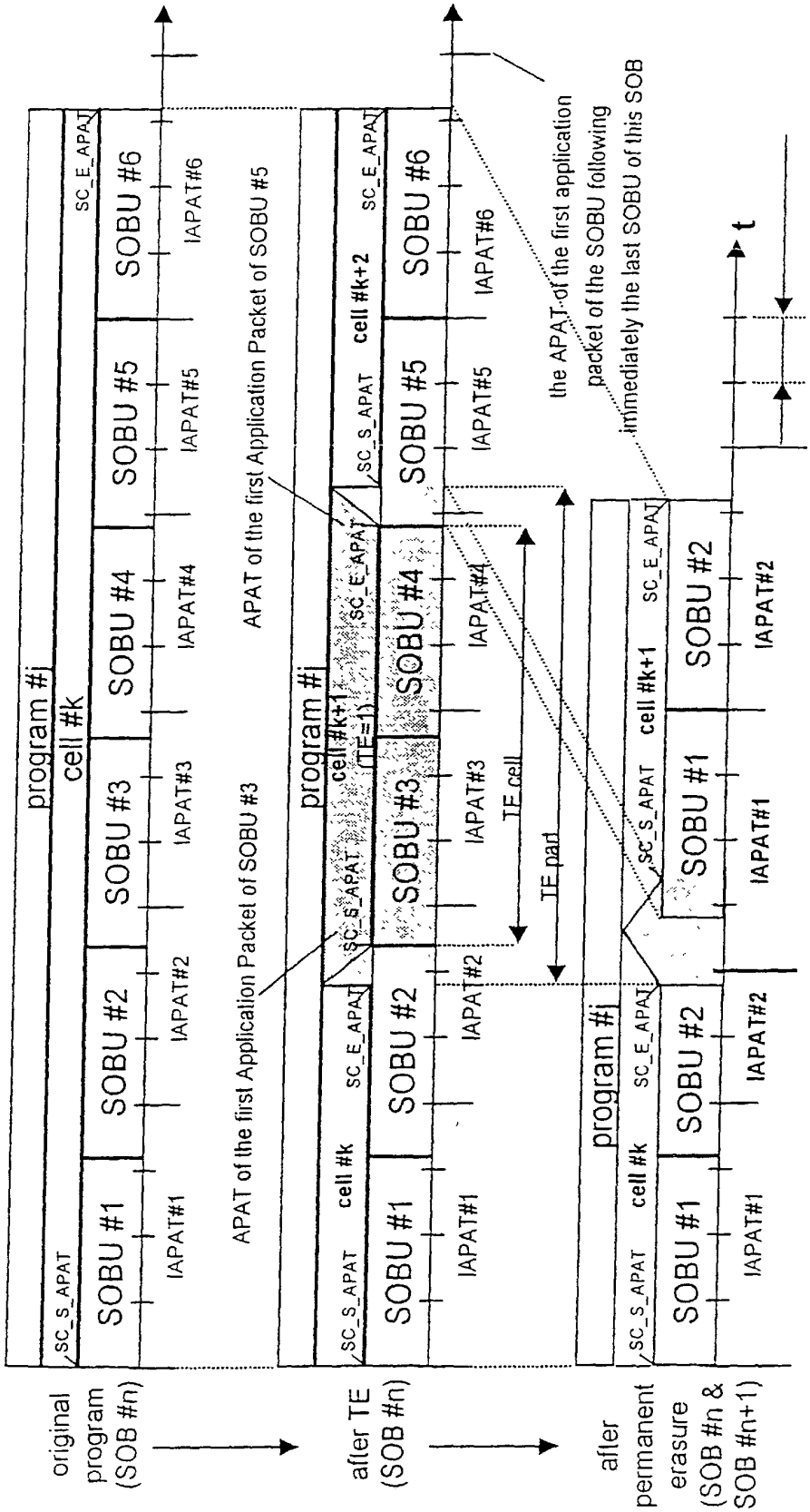

Figure 1

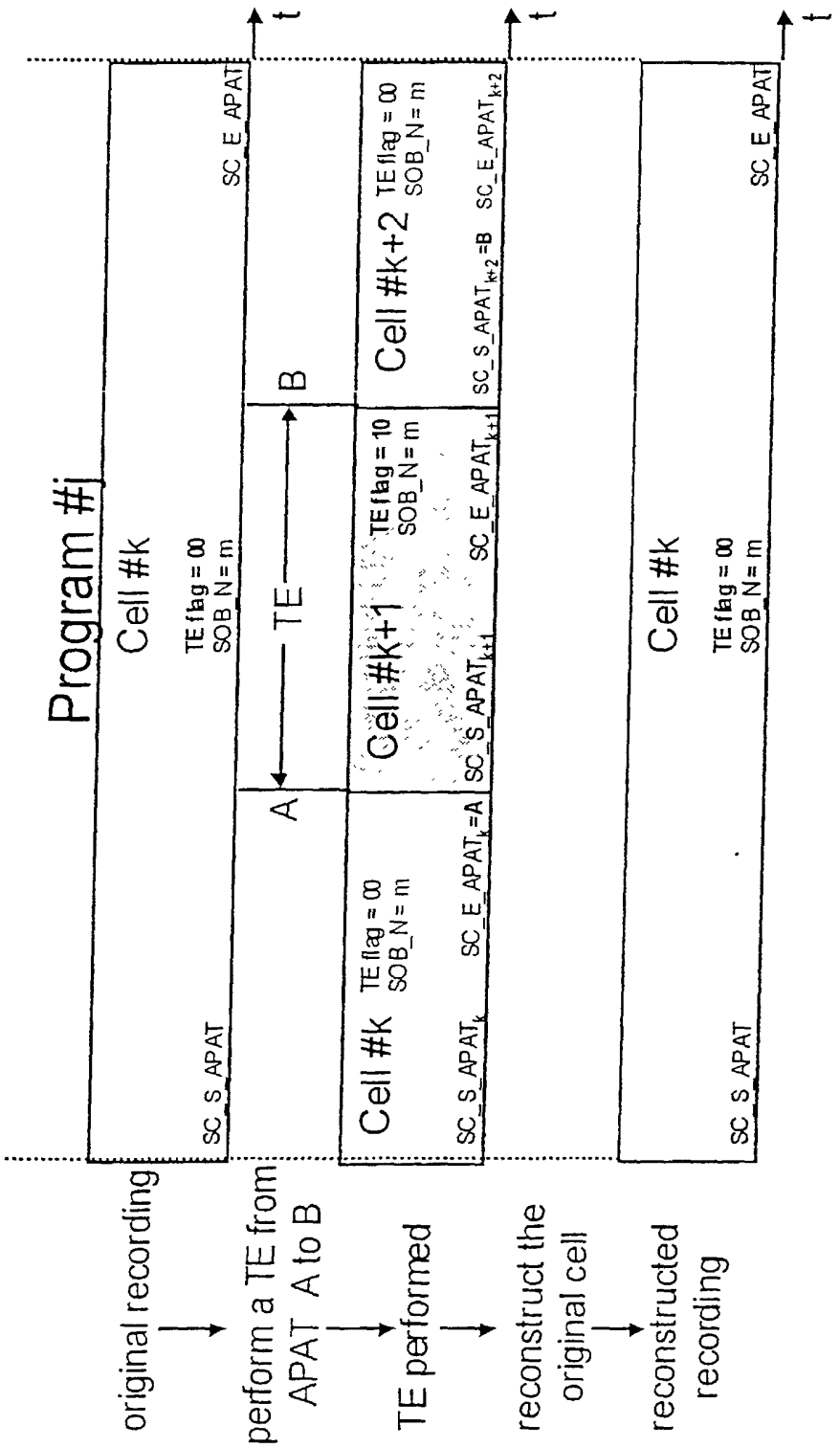
Program #j
Cell #k
TE flag = 00
SOB_N = m
SC_S_APAT
SC_E_APAT
A
TE
B
Cell #k
TE flag = 00
SOB_N = m
SC_S_APAT_k
SC_E_APAT_k=A
Cell #k+1
TE flag = 10
SOB_N = m
SC_S_APAT_k+1
SC_E_APAT_k+1
Cell #k+2
TE flag = 00
SOB_N = m
SC_S_APAT_k+2=B
SC_E_APAT_k+2
Cell #k
TE flag = 00
SOB_N = m
SC_S_APAT
SC_E_APAT
t
original recording
perform a TE from APAT A to B
TE performed
reconstruct the original cell
reconstructed recording

Fig. 2

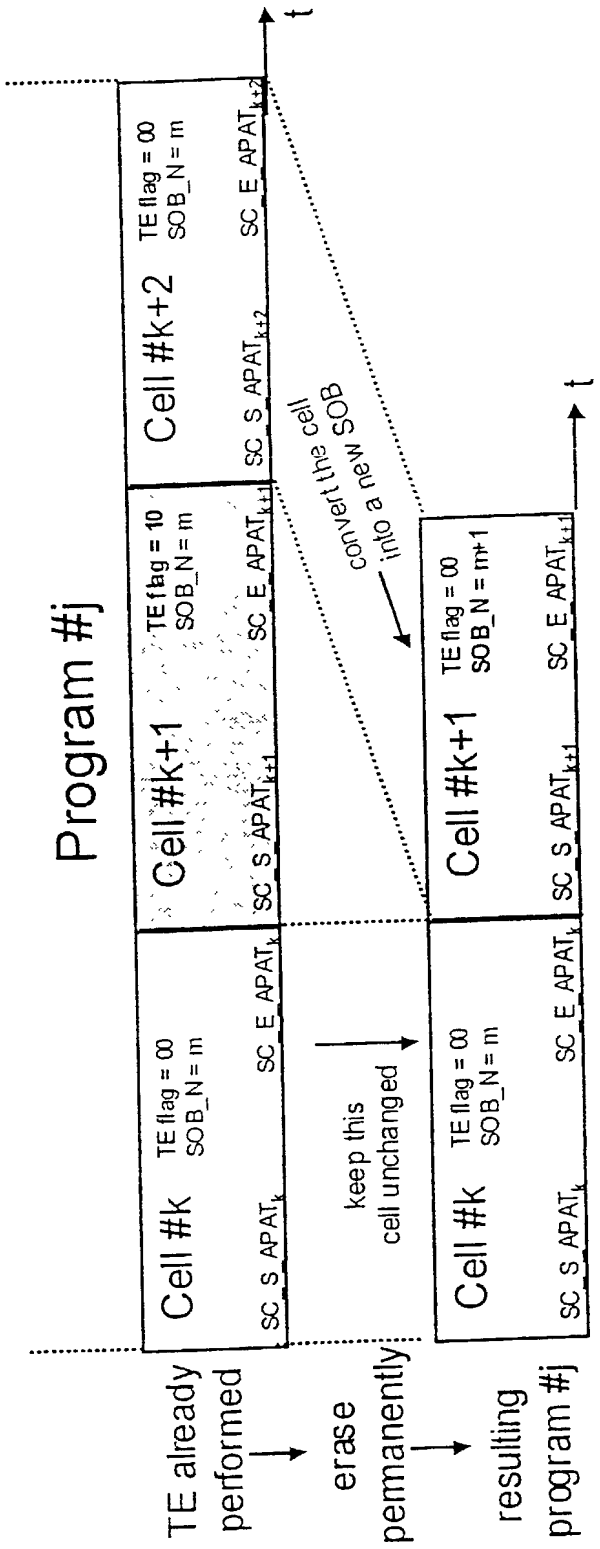
Program #j
Cell #k
TE flag = 00
SOB_N = m
SC_S_APAT$_k$
SC_E_APAT$_k$
Cell #k+1
TE flag = 10
SOB_N = m
SC_S_APAT$_{k+1}$
SC_E_APAT$_{k+1}$
Cell #k+2
TE flag = 00
SOB_N = m
SC_S_APAT$_{k+2}$
SC_E_APAT$_{k+2}$
t
keep this cell unchanged
convert the cell into a new SOB
Cell #k
TE flag = 00
SOB_N = m
SC_S_APAT$_k$
SC_E_APAT$_k$
Cell #k+1
TE flag = 00
SOB_N = m+1
SC_S_APAT$_{k+1}$
SC_E_APAT$_{k+1}$
t
TE already performed
erase permanently
resulting program #j

Fig. 3

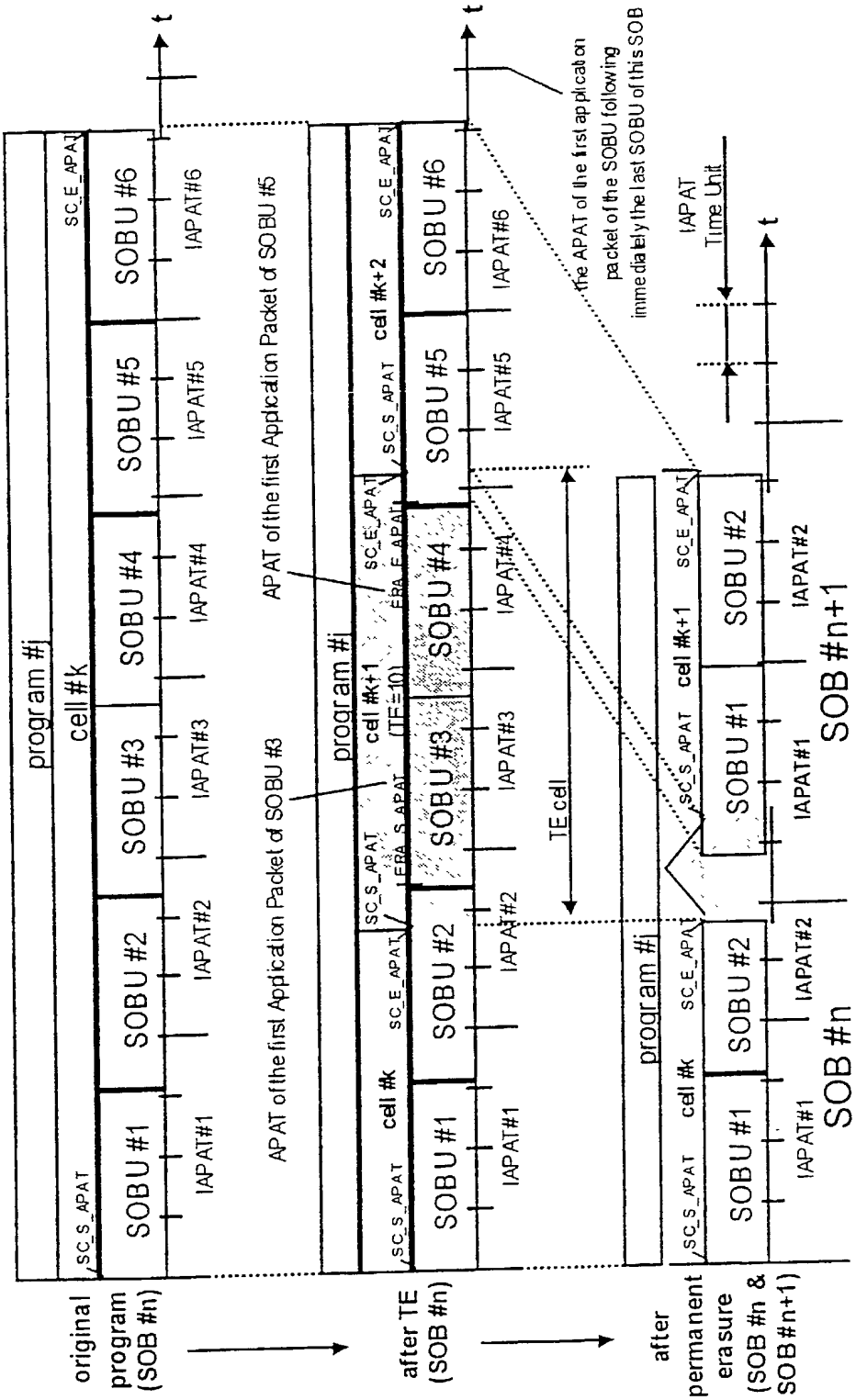

Fig. 4

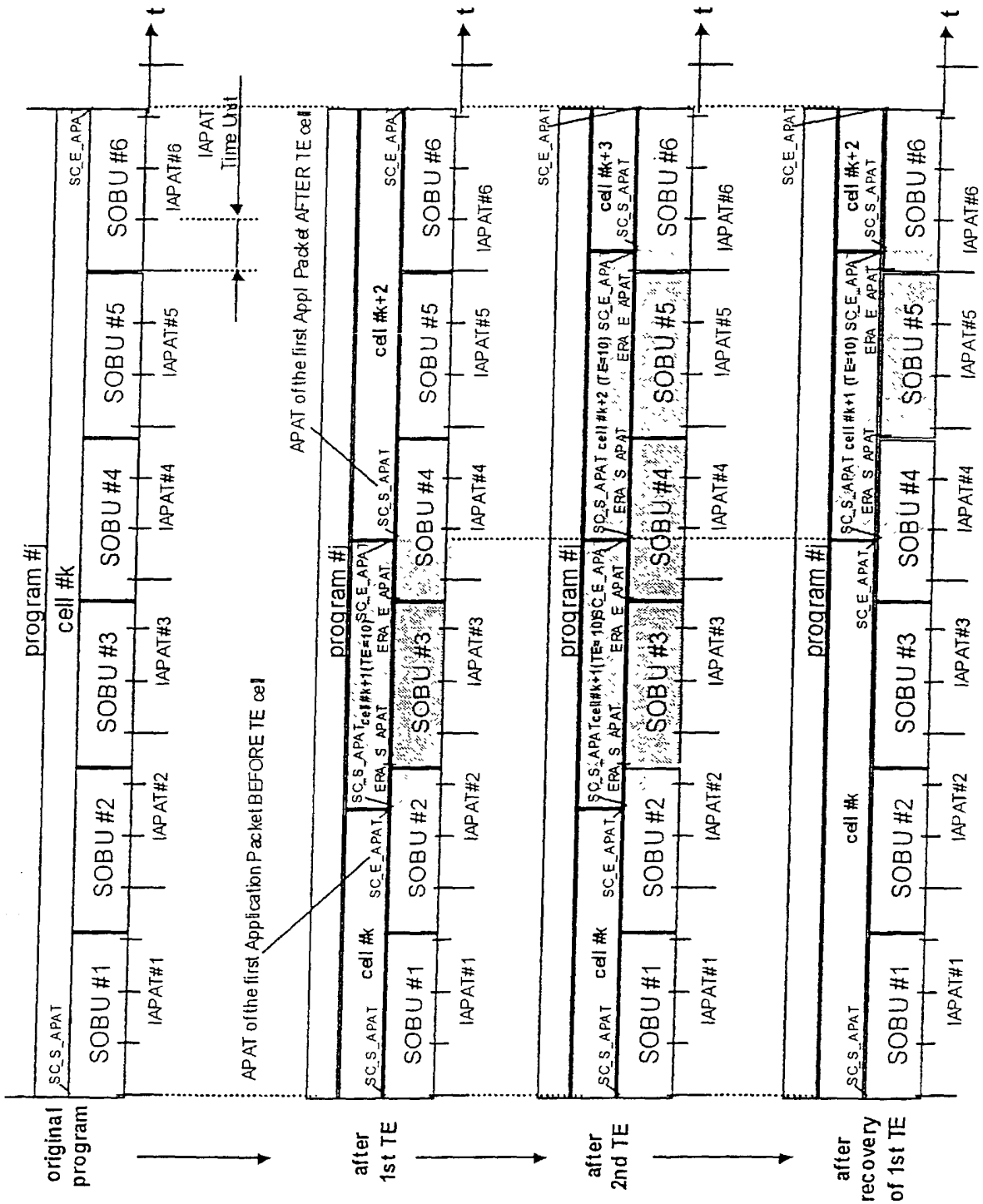
original program
after 1st TE
after 2nd TE
after recovery of 1st TE
program #i
cell #k
cell #k+2
cell #k+3
cell #k+1
SOBU #1
SOBU #2
SOBU #3
SOBU #4
SOBU #5
SOBU #6
SC_S_APAT
SC_E_APAT
IAPAT#1
IAPAT#2
IAPAT#3
IAPAT#4
IAPAT#5
IAPAT#6
IAPAT Time Unit
APAT of the first Application Packet BEFORE TE cell
APAT of the first Appl Packet AFTER TE cell
ERA_S_APAT
ERA_E_APAT
t

Fig. 5

DECLARATION FOR UNITED STATES PATENT APPLICATION,
POWER OF ATTORNEY, DESIGNATION OF CORRESPONDENCE ADDRESS

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD FOR TEMPORARILY ERASING A PART OF A PROGRAM

the specification of which
(CHECK ONE) ( ) is attached hereto.
(xx) was filed on April 25, 2000, Application Serial. No. PCT/EP 00/03680 and was amended on .

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 CFR 1.56(a).

I hereby claim foreign priority benefits under 35 USC 119 of any foreign application(s) for patent, utility model, design or inventor's certificate having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
Number	Country	Date Filed	Yes	No
99109065.5	EP	May 07, 1999	xx	
99109670.2	EP	May 17, 1999	xx	

I hereby claim the benefit under 35 USC 120 of any US Application(s) listed below, and, insofar as the subject matter of each of the claims of this Application is not disclosed in the prior US application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 CFR 1.56(a).

Serial No.: Filed:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under of 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Joseph S. Tripoli (Reg. No. 26,040) (1) Telephone: (609) 734-9443.

Address all correspondence to Joseph S. Tripoli, Patent Operations - Thomson multimedia Licensing, Inc. - CN 5312 - Princeton, New Jersey 08543-0028.

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